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(54) **Multi-card cellular telephone apparatus**

(57) A multi-card device for telecommunications, in particular a multi-card cellular telephone apparatus (1), is disclosed that comprises: a central processing unit;

and a plurality of SIM cards that are connected to the central processing unit through slots (16) and that are selectively managed by the central processing unit.

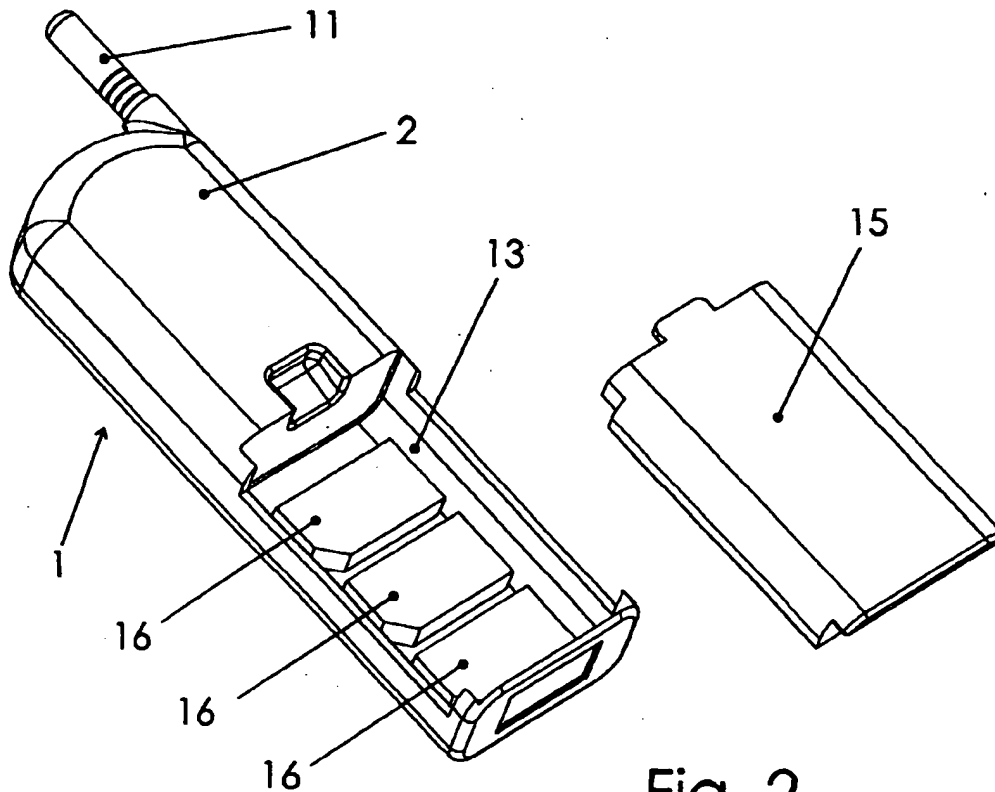


Fig. 2

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Description

[0001] The present invention refers to a telecommunications device adapted to operate with a plurality of cards, and in particular to a cellular telephone apparatus equipped with a plurality of cards of the "SIM card" type.

[0002] The cellular telephone apparatus are known in the art and their very widespread growing diffusion occurred simultaneously with their technologic development so that they are enabled to perform an increasing and more and more sophisticated number of functions.

[0003] Another parallel growth was the one of the providers of cellular telephone services, both at national and international level, and at local level. Nowadays users have to deal with a high number of providers of connections and services, in order to be connected to which it is necessary to purchase suitable customized telephone cards containing, first of all, the phone number assigned to the provider's user. In case a user wishes to change the type of providers according to the type of phone call that he wishes to make, to the type of time range in which such phone call occurs, or due to other reasons, he has to turn off his own cellular phone, remove the previous provider's card and insert the new card; then, he has to turn on again his phone, possibly keying-in access keywords and make the phone call. If it is necessary to carry out such operations frequently, this can become very disturbing and cumbersome to realize. Moreover, when there are different providers offering different time rate conditions according to the period in which the phone call occurs, it is not at all practical to proceed with continuous manual replacements of cards and remember the most favourable time rate situation according to the period.

[0004] Object of the present invention is solving the above prior-art problems, by providing a multi-card device, in particular a cellular telephone apparatus for telecommunications that contains therein a plurality of telephone cards with which it is able to selectively operate, upon the operator's choice or in a completely automatized way according to the time of the day in which the phone call occurs, without having every time to place the involved card inside the cellular phone.

[0005] The present invention will be described with reference to cellular telephone apparatus, but obviously people skilled in the art will understand that it can be applied to any device that is suitable to operate with different types of cards, by inserting them inside the device itself.

[0006] The above and other objects and advantages of the invention, as will appear from the following description, are obtained by a multi-card device as claimed in Claim 1. Preferred embodiments and non-trivial variations of the present invention are claimed in the dependent Claims.

[0007] The present invention will be better described by some preferred embodiments thereof, given as a non-limiting example, with reference to the enclosed drawings, in which:

- Figure 1 is a front perspective view of an embodiment of the multi-card device according to the present invention applied to a cellular telephone apparatus;
- Figure 2 is a rear perspective view of the cellular telephone apparatus in Fig. 1;
- Figure 3 is a flow diagram of a turning-on and first operation process of the device of the invention;
- Figure 4 is a flow diagram of the management process for slots and cards activities in the device of the invention; and
- Figure 5 is a block diagram of the time management process of an automatically-activated agenda for the device of the invention.

[0008] With reference to Figs 1 and 2, the multi-card device of the invention is shown in its preferred embodiment, that is the one of a cellular telephone apparatus (hereinbelow briefly called "cellular phone") 1 of a known type, composed of a support body 2 that can be manually grasped. Such support body 2 is equipped with a keypad 3 containing numeric keys 5 to dial telephone numbers and functional keys 7 that perform various functions, among which turning the cellular phone 1 on and off, etc. The cellular phone 1 is then equipped, in a known way, with a display 9 and a communication antenna 11 of the fixed or removable type. As better appears from Fig. 2, the cellular phone 1, preferably in its rear part, is equipped with a recess 13, adapted to be covered by a suitable cover 15, inside which there are a plurality (in Fig. 2 there are 3 being shown) of housings (the so-called "slots") 16 each one adapted to contain a card (not shown), in this case of the telephonic type, of a provider of various types of telephone services. Such cards are usually of the intelligent type, that is they are equipped with a microprocessor (not shown) adapted to perform a certain number of functions pre-set by the provider itself: such cards are commonly known with the name of "SIM (Subscriber Identity Module) cards" and as such they will be referred to hereinbelow in the present description.

[0009] The cellular phone 1 hereby summarizingly described, since it is known in the art, is equipped inside with an integrated circuit board (not shown) comprising a central processing unit (or CPU) suitable, in addition to performing the common functions for which such cellular phone 1 is adapted and that are known in the art, also to carry out the simultaneous and parallel management of the above SIM cards housed in slots 16. Such management is configured in a set of procedures, that are respectively shown in Figs 3 to 5 and that will be described in detail below.

[0010] In particular, Figure 3 is a flow diagram of a turning-on and first operation process of the device 1 of the

invention.

[0011] The automatic activation process for SIM cards at turning-on includes the steps of:

- turning on (F1) the device 1;
- should a specific management routing be missing, sequentially scanning (F2) slots 16 and requesting a PIN (Personal Identification Number) code for every detected SIM card, operation that all SIM cards owners must perform to activate their own cards;
- checking (F3) whether the time agenda (that will be described afterwards) is active, and in a positive case reading (F4) the internal clock time and activating slots 16 as function of the time range assigned in the time agenda itself;
- checking (F5) whether there are customized priorities for slots 16, and in a positive case activating (F6) the slot 16 whose priority is highest;
- sequentially scanning (F7) slots 16 with the obtained PIN code and activating the first slot being found with a chip card; and
- activating (F8) the usual functions of the device 1 (for example the normal functions of the cellular phone 1) with the first activated slot.

[0012] The management process of slots and cards activities in the device 1 of the invention will now be described with reference to the flow diagram in Fig. 4.

[0013] The management process for parallel activities in slots 16 and SIM cards in Fig. 4 comprises the steps of:

- accessing (F10) the slots and SIM cards activities management menu;
- if an automatic choice is present (F11), automatically scanning (F12) the busy slots 16, and choosing and activating the slots 16 as function of signal power, in case of conflict applying the priorities assigned to slots 16 (in a customized way or by default); then, deactivating (F13) the priority of slots 16 and deactivating (F14) the time agenda, going back to the starting menu (F10);
- should an automatic choice be absent (F11), checking (F15) whether the current provider variation is requested;
- in case of a request to change the current provider (F15), keying-in (F16) the slot 16 position to be activated independently from the assigned priorities, activating (F17) the keyed-in slot 16, deactivating (F13) the slots 16 priority and deactivating (F14) the time agenda, going then back to the menu (F10);
- in case of lack of a variation request for the current provider (F15), checking (F18) the existence of a customized priority for slots 16;
- if a customized priority is present for slots 16 (F18), performing possible setting modifications (F19) (for example, after having keyed-in the slot number, confirming or keying-in the new assigned priority (F20)) and activating (F22) the customized priority for slots 16, going then back to the starting menu (F10);
- in case of lack of a customized priority for slots 16 (F18), deactivating the customized priority for slots 16;
- checking (F23) the activation of the automatic time agenda;
- in case of lack of activation of the automatic time agenda (F23), deactivating the time agenda (F26) and going back to the starting menu (F10);
- in case of activation of the automatic time agenda (F23), performing possible modifications (F24) (for example, after having keyed-in the slot number, confirming or keying-in the activation start time (F25)) and activating (F28) the time agenda, finally going back to the starting menu (F10).

[0014] In addition to these steps, before activating the time agenda (F28), a step (F27) for a confirmation request before activating a new slot 16 can be provided, possibly emitting a sound signal if the activation is of the automatic type.

[0015] Finally the time management of an automatic activation agenda for the device 1 of the invention will now be described with reference to the flow diagram in Fig. 5.

[0016] Scope of the automatic activation process of the slots 16 according to time information in Fig. 5 is making a time agenda active that operates under the same principle of electronic agendas. In fact, an "alarm" signal is provided at the prefixed time, which triggers the activation mini-procedure of the programmed slot 16.

[0017] A variation increasing the potentialities of such agenda provides adding the day-of-the-week parameter.

[0018] Hereinbelow an example is shown about a cellular phone 1 on which two SIM cards are installed, one of which is of the company type or anyway linked to the professional activity (Slot 1), while the other one of which is of the personal type (Slot 2). A programming example of the time agenda as function of these two SIM cards is shown in the following Table 1.

TABLE 1

Activation time					
	Slot 1	Slot 2	Slot 3	...	Slot n
Monday	8.30	18.30	n.a.	...	n.a.
Tuesday	8.30	18.30	n.a.	...	n.a.
Wednesday	8.30	18.30	n.a.	...	n.a.
Thursday	8.30	18.30	n.a.	...	n.a.
Friday	8.30	18.30	n.a.	...	n.a.
Saturday	8.30	12.30	n.a.	...	n.a.
Sunday	--:--	--:--	n.a.	...	n.a.

[0019] As clearly appears from the above Table, in any case the personal card (Slot 2) will remain active from Saturday at 0:30 p.m. to Monday at 8:29 a.m.

[0020] The process in Fig. 5 comprises the steps of:

- receiving (F40) a signal from the agenda, where such signal comprises for example day of the week and time;
- checking (F41) the presence of a current connection and, in case of lack of connection, waiting (F42) till the connection is performed;
- checking (F43) whether a sound signal emission parameter is active and emitting (F44) the sound signal if the result is positive;
- checking (F45) whether a confirmation request parameter is active, and if the result is negative activating (F47) a new slot 16;
- in case the confirmation request parameter is active, checking (F46) whether activating a new slot 16 and activating (F47) the new slot 16 if the result is positive;
- performing (F48) the usual functions of the device 1, like for example the usual functions of a cellular phone 1.

Claims

1. Multi-card device for telecommunications, in particular multi-card cellular telephone apparatus (1), characterised in that it comprises:

- a central processing unit; and
- a plurality of SIM cards connected to said central processing unit and selectively managed by said central processing unit.

2. Multi-card device (1) according to Claim 1, characterised in that it is equipped with a plurality of slots (16) to house said plurality of SIM cards and with displaying means (9) and key input means (3, 5, 7) respectively to display and choose operating functions to be activated.

3. Multi-card device (1) according to Claim 1, characterised in that said central processing unit is adapted to perform an automatic activation process for said SIM cards upon turning-on.

4. Multi-card device (1) according to Claim 3, characterised in that said automatic activation process of said SIM cards upon turning-on comprises the steps of:

- turning on (F1) said device (1);
- sequentially scanning (F2) said slots (16) and requesting a PIN code for every detected SIM card;
- sequentially scanning (F7) said slots (16) with the obtained PIN code and activating the first slot being found with a chip card; and
- activating (F8) the usual functions of said device (1) with said first activated slot.

5. Multi-card device (1) according to Claim 4, characterised in that said process further comprises, after said scanning step (F2), the steps of:

- checking (F3) the presence of an active time agenda; and
- in case an active time agenda is present, reading (F4) the internal clock time and activating the slots (16) as function of the assigned time range.

5 6. Multi-card device (1) according to Claim 4, characterised in that said process further comprises, after said scanning step (F2), the steps of:

- checking (F5) the presence of customized priorities for said slots (16); and
- in case of presence of customized priorities for said slots (16), activating (F6) the slot (16) whose priority is highest.

7. Multi-card device (1) according to Claim 1, characterised in that said central processing unit is adapted to perform a parallel activities management process for said slots (16) and said SIM cards.

15 8. Multi-card device (1) according to Claim 7, characterised in that said parallel activities management process for said slots (16) and said SIM cards comprises the steps of:

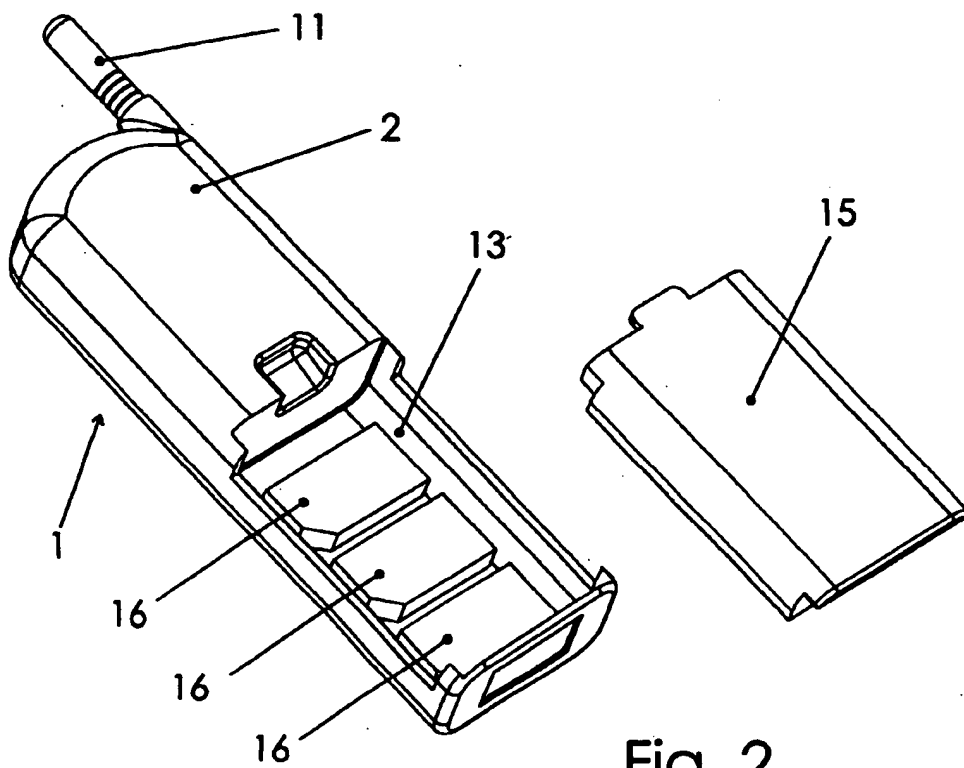
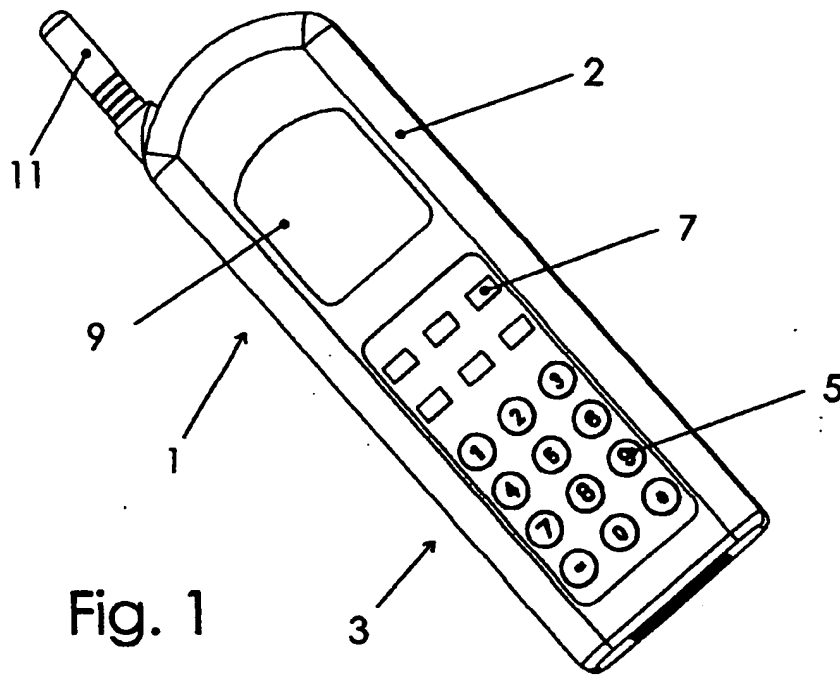
- accessing (F10) the slots and SIM cards activities management menu;
- if an automatic choice is present (F11), automatically scanning (F12) the busy slots (16), and choosing and activating said slots (16) as function of signal power, in case of conflict applying the priorities assigned to said slots (16), deactivating (F13) the priority of said slots (16) and deactivating (F14) the time agenda;
- should an automatic choice be absent (F11), checking (F15) whether the current provider variation is requested;
- in case of a request to change the current provider (F15), keying-in (F16) the slot (16) position to be activated independently from assigned priorities, activating (F17) the keyed-in slot (16), deactivating (F13) the priority of said slots (16) and deactivating (F14) the time agenda;
- in case of lack of a variation request for the current provider (F15), checking (F18) the existence of a customized priority for said slots (16);
- if a customized priority is present for said slots (16) (F18), performing possible setting modifications (F19) and activating (F22) the customized priority for said slots (16);
- in case of lack of a customized priority for said slots (16) (F18), deactivating the customized priority for said slots (16);
- checking (F23) the activation of the automatic time agenda;
- in case of lack of activation of the automatic time agenda (F23), deactivating the time agenda (F26);
- in case of activation of the automatic time agenda (F23), performing possible modifications (F24, F25) and activating (F28) the time agenda.

9. Multi-card device (1) according to Claim 8, characterised in that it further comprises, before the activating step (F28) of the time agenda, the step of activation confirmation requesting (F27) for a new slot (16) and emitting a sound signal if this is an automatic activation.

10. Multi-card device (1) according to Claim 1, characterised in that said central processing unit is adapted to perform an automatic activation process for said slots (16) according to time information.

45 11. Multi-card device (1) according to Claim 10, characterised in that said automatic activation process of said slots (16) according to time information comprises the steps of:

- receiving (F40) a signal from the agenda;
- checking (F41) the presence of a current connection and, in case of lack of connection, waiting (F42) till the connection is performed;
- checking (F43) whether a sound signal emission parameter is active and emitting (F44) the sound signal if the result is positive;
- checking (F45) whether a confirmation request parameter is active, and if the result is negative activating (F47) a new slot (16);
- in case the confirmation request parameter is active, checking (F46) whether activating a new slot (16) and activating (F47) the new slot (16) if the result is positive;
- performing (F48) the usual functions of said device (1).



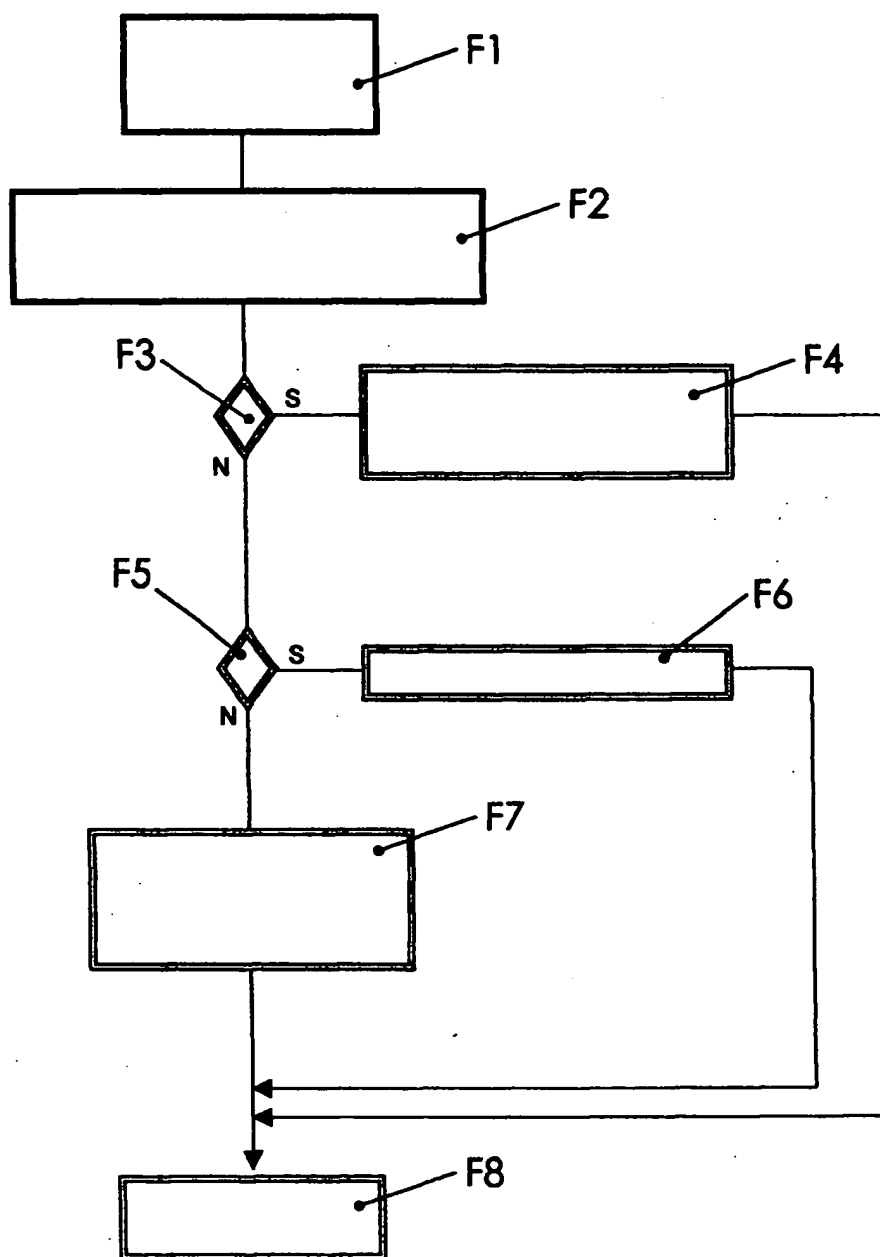


Fig. 3

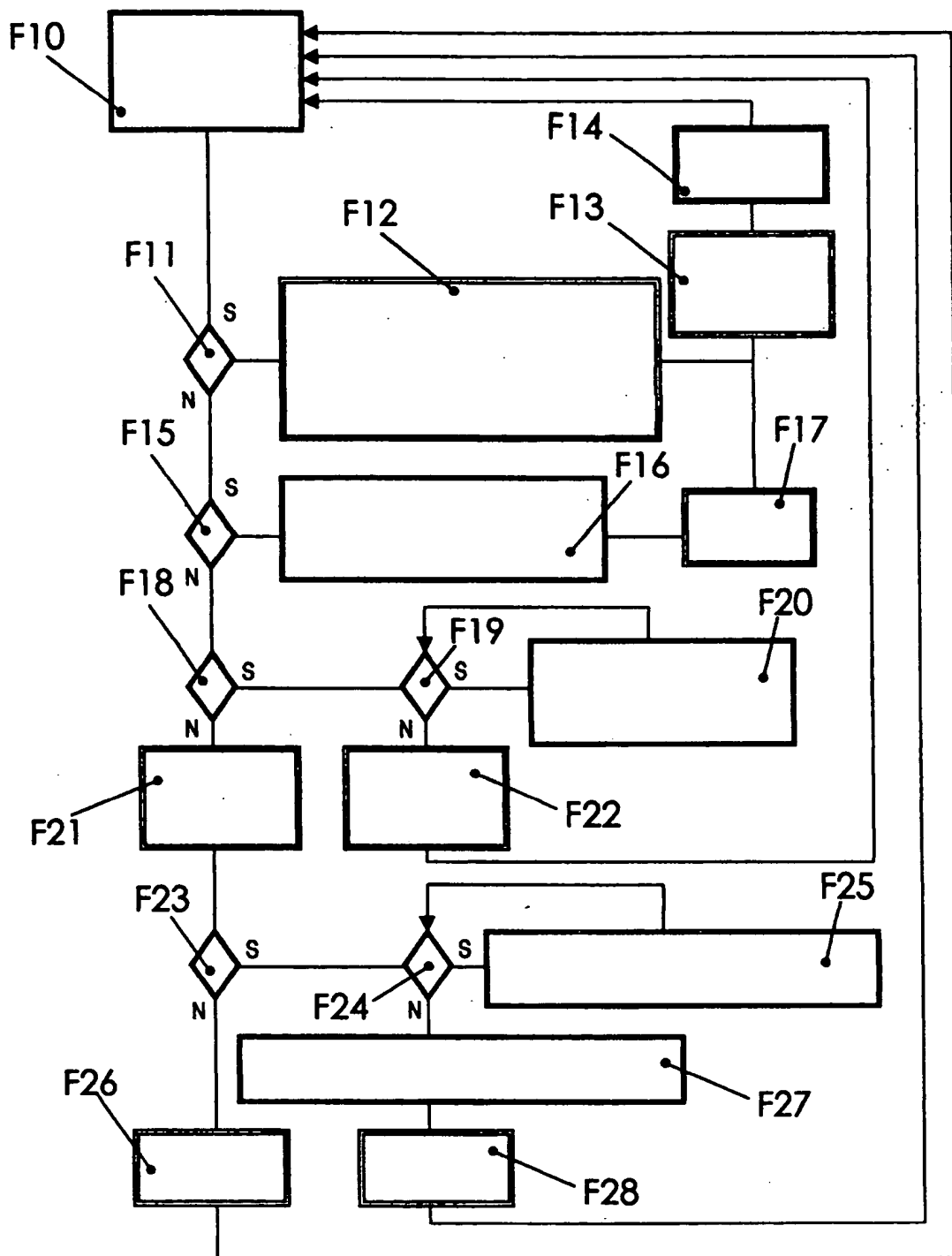


Fig. 4

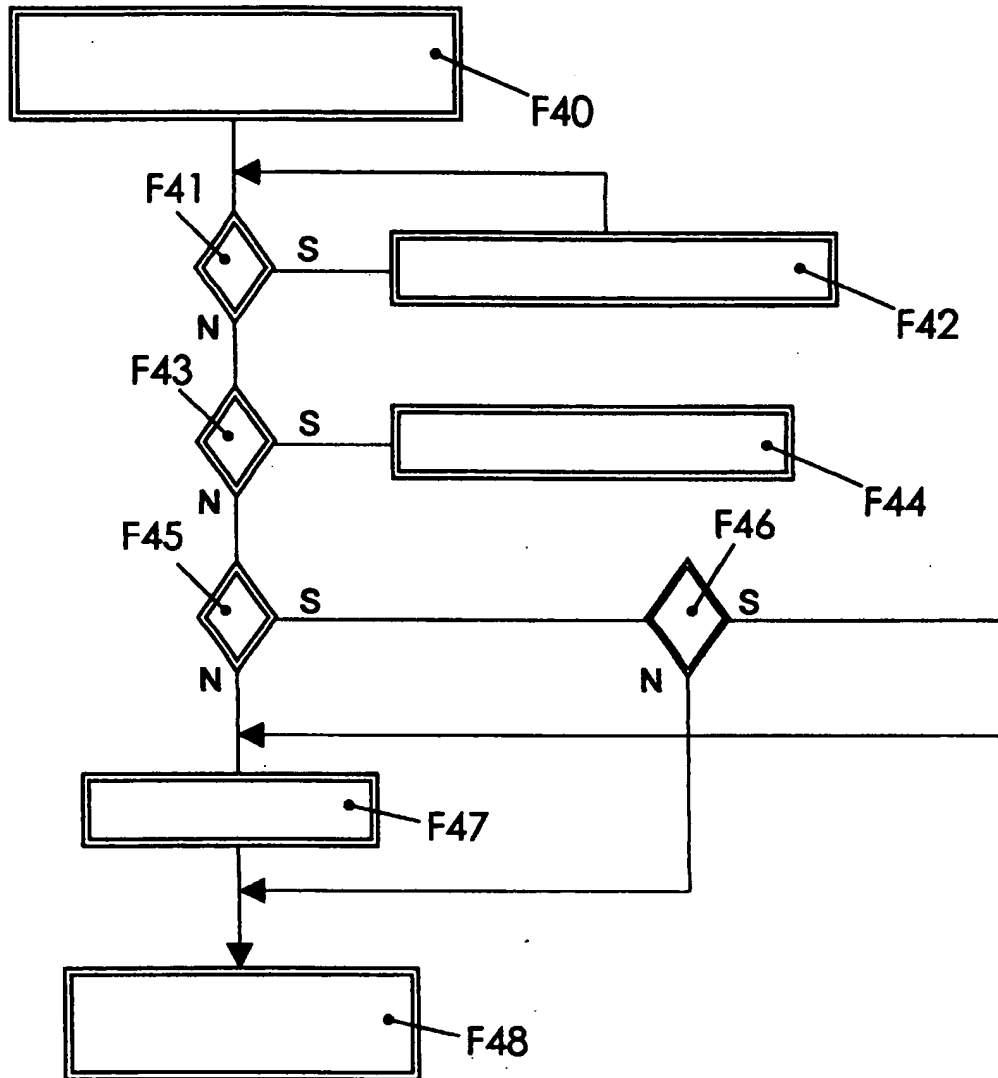


Fig. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 99 83 0691

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The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 29 March 2000	Examiner Leouffre, M
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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